WINZEN RESEARCH INC., MINNEAPOLIS 20, MINNESOTA

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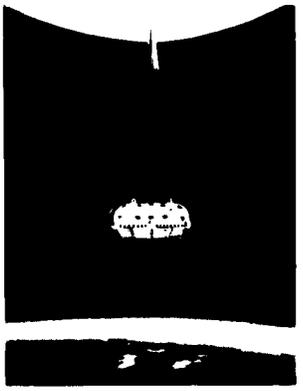
Otto C. Winzen
President



WINZEN
RESEARCH INC.
8401 LYNDALE AVENUE SOUTH
MINNEAPOLIS 20, MINNESOTA
TELEPHONE TUXEDO 1-5871

7 February 1963

Chief of Naval Research
Code 421
Department of the Navy
Washington 25, D.C.

Subject: Contract Nonr 1460(18)

Gentlemen:

Enclosed herewith is Winzen Research Inc. Project Sky Hook Report for the period 1 January 1962 through 31 December 1962 under subject contract.

Very truly yours,

WINZEN RESEARCH INC.

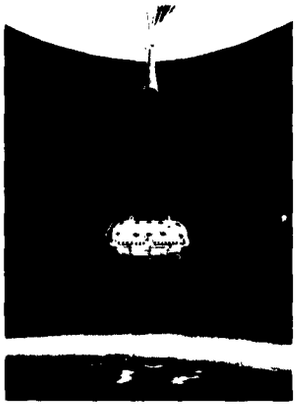
Robert M. Emberson
Project Engineer

RME:dr

encl: WRI Report 1273-R (2 cys)

cc: Code 461, Wash. D.C. (1 cy)
Code 422, Wash. D.C. (2 cys)
ONR Fld. Rep. Mpls. (3 cys)
ASTIA (1 cy)
ONR, Chicago Branch (1 cy)
Dr. James Earl - U of Minn (1 cy)
Dr. Henry J. Mastenbrook, NRL (1 cy)

OTTO C. WINZEN
President



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RESEARCH INC.
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PROJECT SKY HOOK REPORT

Contract Nonr 1460(10)

Period 1 January 1962 through
31 December 1962

Report No.: 1273-R

Submitted To: Chief of Naval Research
Attention: Code 421
Department of the Navy
Washington 25, D.C.

Submitted By: Winzen Research Inc
Minneapolis, Minnesota

Prepared By: Robert M. Enderson
Project Engineer

Approved By: Otto C. Winzen

Date: 5 February 1963

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I. SUMMARY

This report covers work accomplished for the United States Navy under Contract Nonr 1460(10). The period covered is 1 January 1962 through 31 December 1962.

During this period, four Skyhook Flights were conducted, two for Dr. James Earl of the Physics Department, University of Minnesota, and two for Dr. Henry J. Mastenbrook of the Naval Research Laboratory. Operational difficulties were encountered on the first flight for Dr. Earl resulting in damage to flight instrumentation and subsequent malfunctions. Balloon performance was good on all flights. Scientific data was obtained on both flights for Dr. Earl, however, scientific payload malfunctions prevented obtaining data on either flight for Dr. Mastenbrook.

II. BALLOON FLIGHT REPORTS

A. FLIGHT NUMBER 908

Flight Number 908 was launched at 1127 Z on 11 June 1962. The flight was conducted for Dr. James Earl of the University of Minnesota. The scientific payload, a magnetometer, was flown on a five million cubic foot, 3/4 mil polyethylene balloon.

The flight was launched from Southport Airport. The combination of an initial failure to secure the launch platform and the development of a cross-wind at launch resulted in a marginal launch operation. As a consequence, the flight instrumentation was damaged at launch resulting in loss of flight control. The flight ascended to and maintained a float altitude of approximately 125,000 feet. Since termination could not be effected due to instrument damage, the flight continued beyond the planned duration. The balloon and payload finally descended and impacted at 1400 Z on 13 June. The scientific success of the flight was very good. The Balloon Flight Report, Time Altitude Drawing No. 100029 and Flight Trajectory Drawing No. 100030 follow.

BALLOON FLIGHT REPORT

Flight No. 908	1127Z, 11 June 1962	
Project No. NA 518	Flight for Dr. James Earl, University of Minnesota	
Scientific Payload	Magnetometer	Weight - 170.00
Scientific Success	Good	

Balloon Data

Manufacturer	Winzen Research Inc.	
Size and Serial No.	5×10^6	No. 22
Type	Natural shape, 3/4 mil polyethylene	
Weight	757 pounds	

Launching Data

Launching Site	Southport Airport	
Launch Method	Platform	
Wind - 5-10 Knots	Sky - Clear	Temperature - 68°
Total Payload - 237 lbs.	Free Lift - 8%	Gross Inflation - 1,073 lbs.

Flight Data

Maximum Altitude - 127,000 feet	Theoretical Altitude - 125,000 feet
Flight Duration - 50 hours - 33 minutes	Altitude Maintenance - Good
Ballast - None	Rate of Ascent - 420 fpm
Landing Site - 65 miles N.E. Missoula, Montana	Time - 1400Z - 13 June
Balloon Performance - Good	Balloon Landing Site - 65 miles N.E. Missoula, Montana

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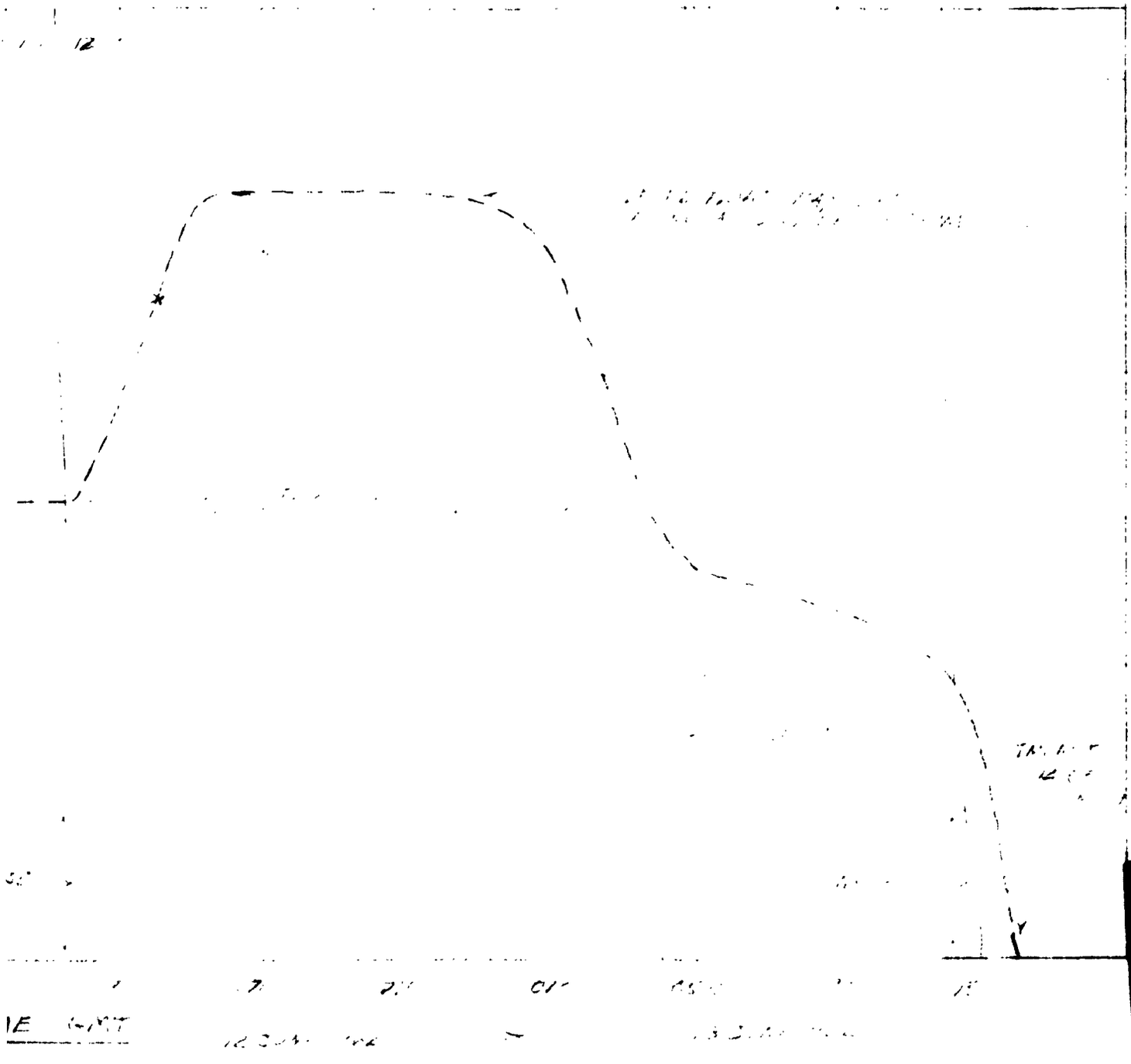

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ALTITUDE VS TIME

WRI FLIGHT #908

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WINZEN RESEARCH INC.
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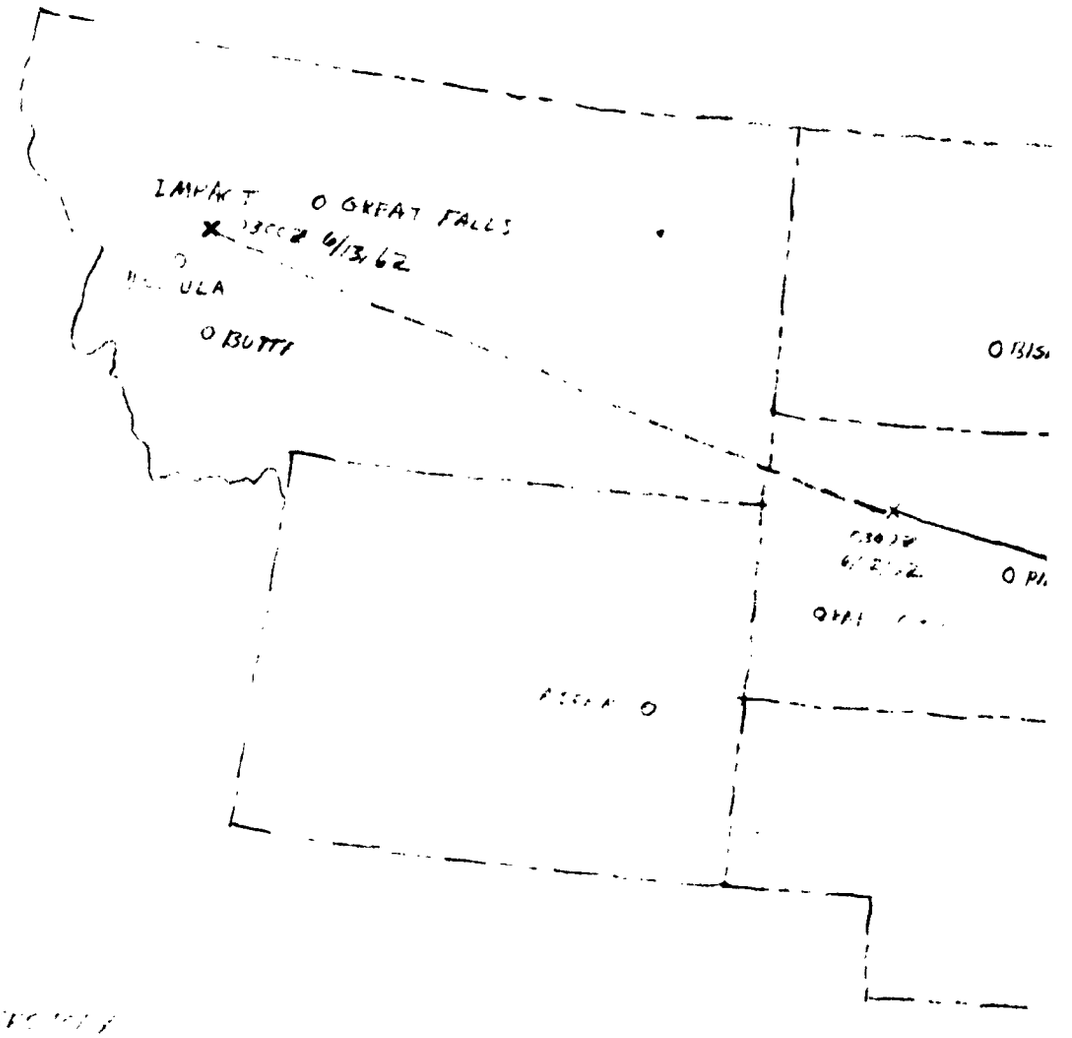
8401 Lyndale So. Minneapolis 20

DRG. NO.
100029

CODE



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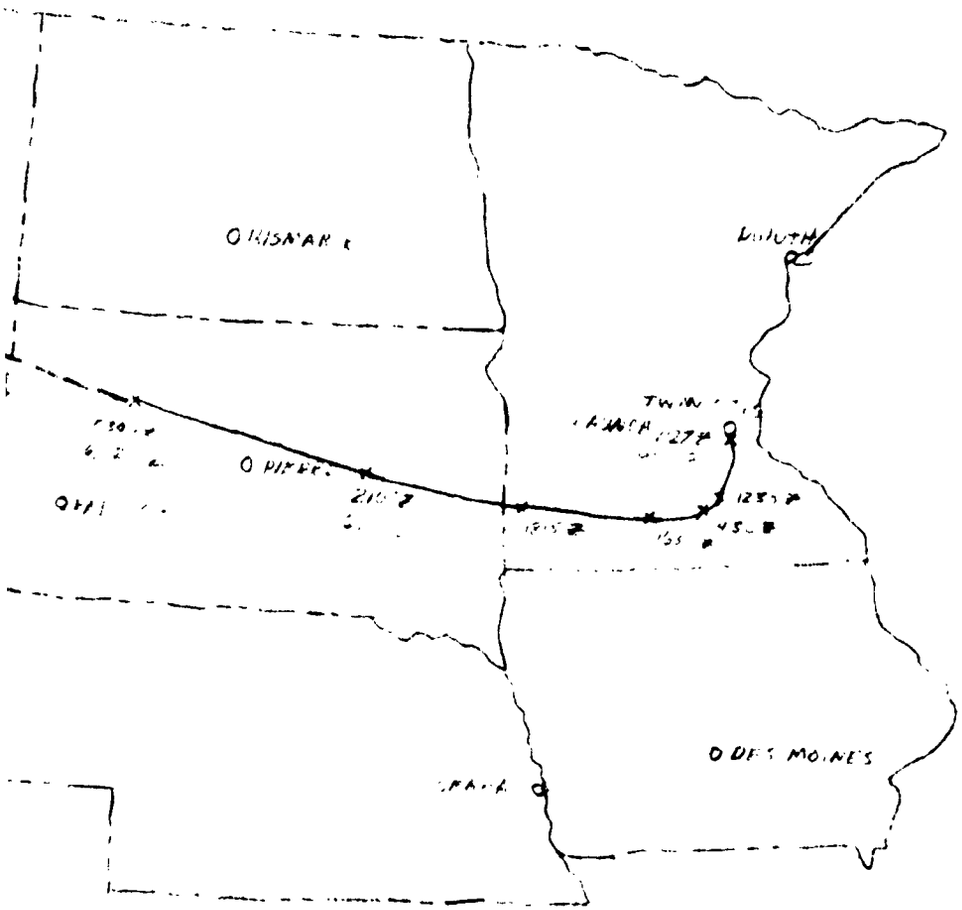

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TRAJECTORY PLOT

WRI FLIGHT NO 908

11 JUNE 1962

SCALE

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DRG. NO.

100030

CODE

B. FLIGHT NUMBER 909

Flight Number 909 was launched at 1105 Z on 21 August 1962. The flight was conducted for Dr. James Earl of the University of Minnesota. The scientific payload was a cloud chamber. A five million, 3/4 mil polyethylene balloon was utilized for the flight.

The flight was launched from Fleming Field, South St. Paul, Minnesota. A standard platform launch was made. On launch, the anchor line cutters failed to operate. The anchor line was then severed at the anchor vehicle and remained attached to the flight train. The flight ascended at 740 fpm to an indicated float altitude of 133,000 feet. The flight was terminated by timer at 2333 Z.

It was determined from tests conducted on the recovered anchor line cutters that the power supplied was marginal for firing three squibs instead of the normal number of two. As a result, the power supply for firing the anchor line cutters was increased to 24 volts so that even if batteries were not at peak, the power would fire three squibs.

The Balloon Flight Report, Time Altitude Drawing No. 300184, and Flight Trajectory Drawing No. 300185 follow.

BALLOON FLIGHT REPORT

Flight No. 908	1105 Z, 21 August 1962
Project No. NA 518	Flight for Dr. James Earl, University of Minnesota
Scientific Payload	Cloud Chamber Weight - 307.00
Scientific Success	Good

Balloon Data

Manufacturer	Winzen Research Inc.
Size and Serial No.	5×10^6 No. 25
Type	Natural shape - 3/4 mil polyethylene
Weight	761 pounds

Launching Data

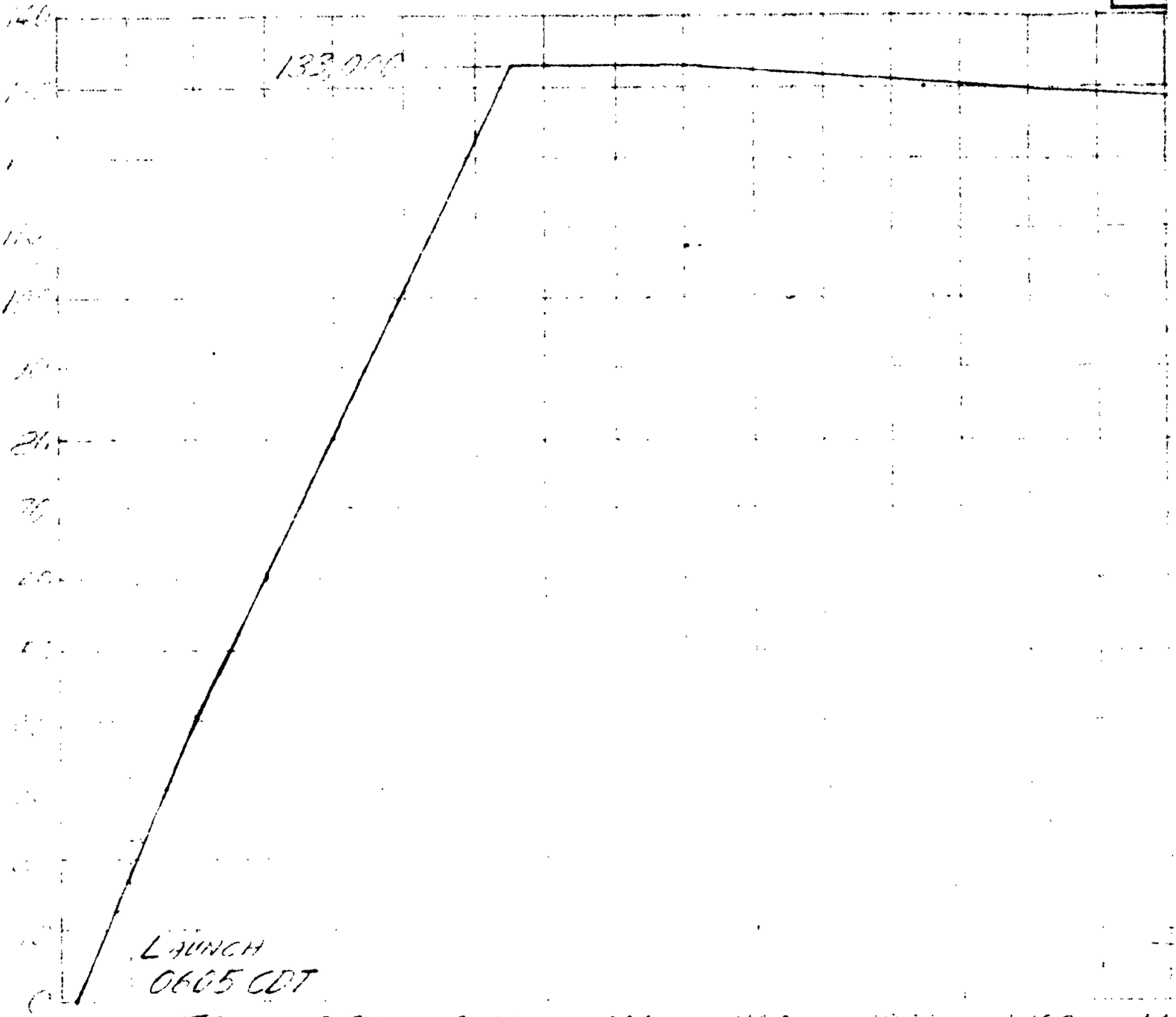
Launching Site	Fleming Field, South St. Paul, Minnesota
Launch Method	Platform

Wind - South 0-5 Knots Sky - Clear Temperature

Total Payload - 406 lbs. Free Lift - 9%, 105 lbs. Gross Inflation - 1,272

Flight Data

Maximum Altitude - 133,000 feet	Theoretical Altitude - 127,000 feet
Flight Duration - 13 hours	Altitude Maintenance - Good
Ballast - None	Rate of Ascent - 740 fpm
Landing Site - 10 miles N.N.E. Brookings	Recovery Time - 1908
Balloon Performance - Good	Balloon Landing Site - Burst



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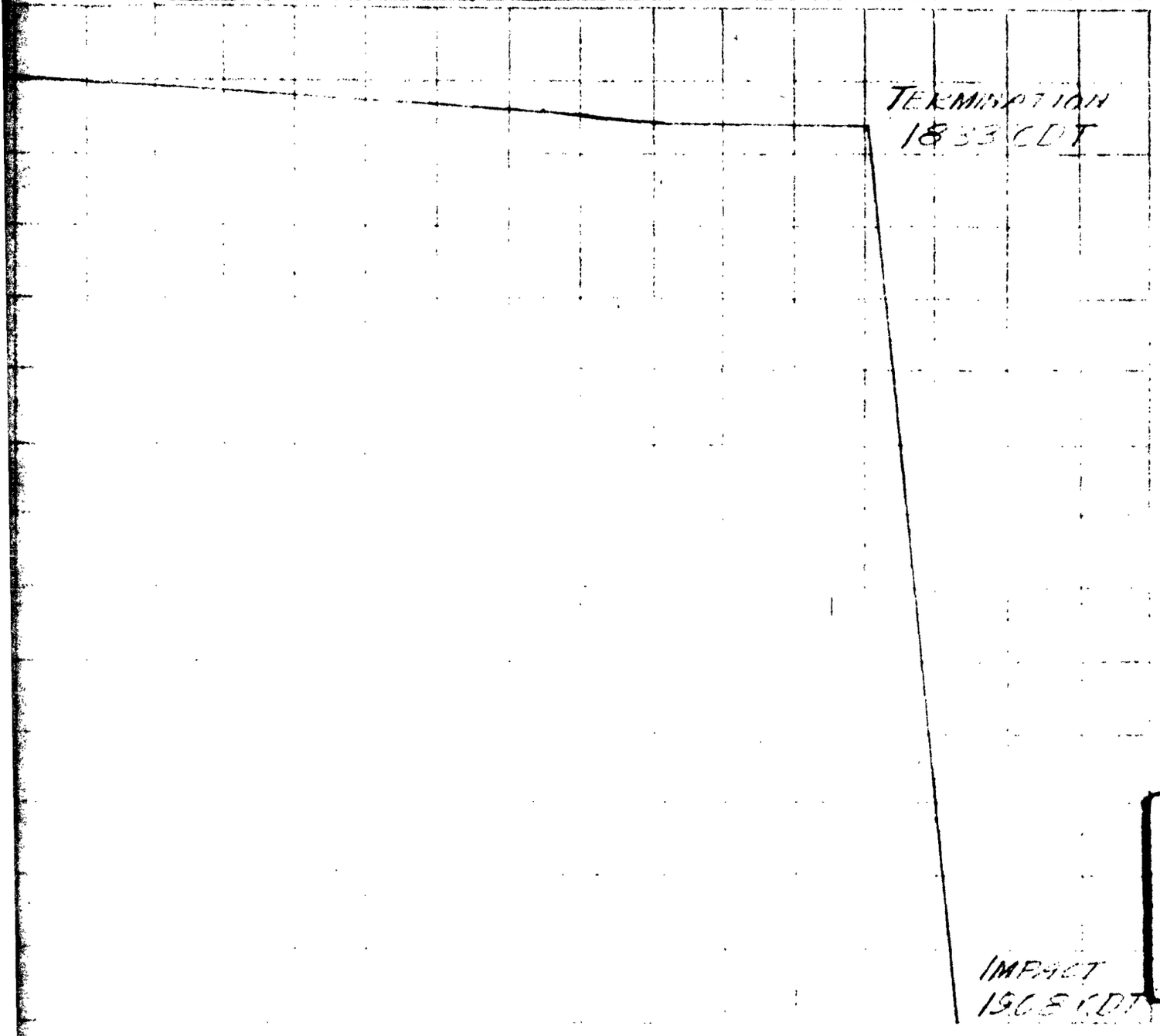

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WINZEN RESEARCH INC.
OFFICE & PLANT
8401 Lyndale So. Minneapolis 20

DRG. NO. 300184

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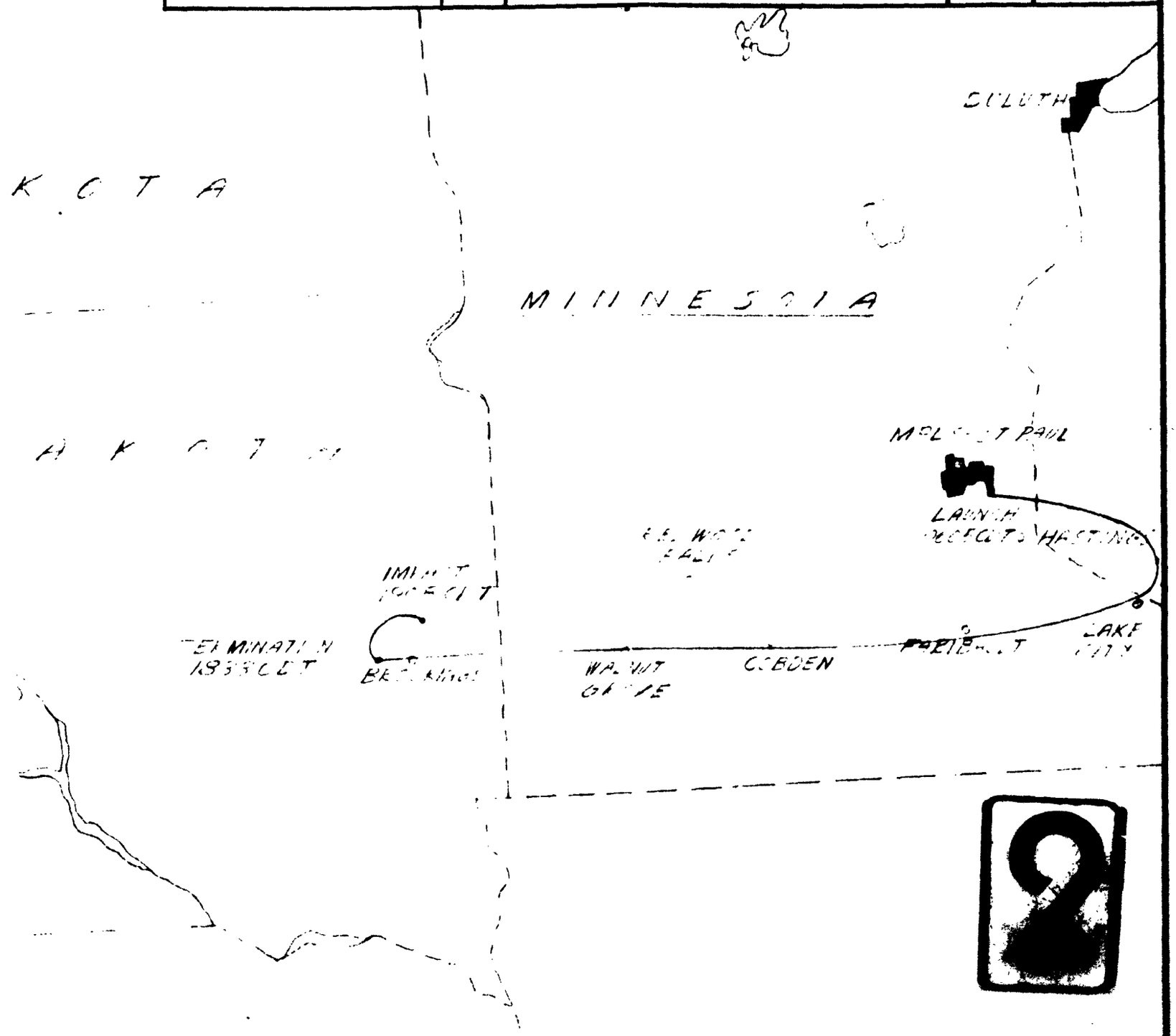

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TRAJECTORY
FLIGHT NO. 903
DATE - 21 AUGUST 1962

SCALE

WT.

WINZEN RESEARCH INC.
OFFICE & PLANT
3401 Lyndale So. Minneapolis 20

DRG. NO.
300185

CODE

C. FLIGHT NUMBER 910

Flight Number 910 was launched from Fleming Field, South St. Paul, Minnesota at 1115 Z on 17 August. The flight was conducted for Dr. Henry J. Mastenbrook of the Naval Research Laboratory. The scientific equipment, Moisture Vapor Measuring Equipment, was flown on a 1-1/4 million cubic foot balloon of 1 mil polyethylene.

A standard Winzen Research Inc. platform launch was conducted without incident. The flight profile required valving the balloon down from its float altitude of approximately 115,000 feet to 90,000 feet with subsequent ballasting back to 115,000 feet. The flight would then be valved down to 44,000 feet at which altitude the FAA Safety Timer would terminate the flight. Immediately after launch the scientific instrumentation stopped functioning. The flight was continued as planned to gain proficiency in controlling the profile despite lack of scientific data. The desired flight profile was obtained. The Balloon Flight Report for this flight follows.

BALLOON FLIGHT REPORT

Flight No. 910 — 1115 Z, 17 August 1962

Project No. NA 518 — Flight for Dr. Henry J. Mastenbrook, Naval Research Laboratory

Scientific Payload H_2O Vapor Measurement — Weight 109.00

Scientific Success None - Payload malfunctioned

Balloon Data

Manufacturer	Winzen Research Inc.	
Size and Serial No.	1-1/4 Million Cubic Foot	No. 38
Type	Natural shape, 1 mil polyethylene	
Weight	369 pounds	

Launching Data

Launching Site: Fleming Field, South St. Paul, Minnesota

Launch Method: Platform

Wind - Calm — Sky - Clear — Temperature - 68° F

Total Payload - 238 pounds — Free Lift - 9%, 54 pounds — Gross Inflation - 66

Flight Data

Maximum Altitude - 117,000 feet	Theoretical Altitude - 115,000 feet
Flight Duration - 7 hours	Altitude Maintenance - Good
Ballast - 100 pounds	Rate of Ascent - 900 fpm
Landing Site - Albert Lea, Minnesota	Recovery Time - 1500 CDT
Balloon Performance - Good	Balloon Landing Site - Unknown

D. FLIGHT NUMBER 911

Flight Number 911 was launched from Fleming Field, South St. Paul, Minnesota at 1050 Z on 22 August 1962. The flight was again conducted for Dr. Mastenbrook of the Naval Research Laboratory. The scientific equipment, Moisture Vapor Measuring Equipment, was flown on a 1-1/4 million cubic foot balloon of 1 mil polyethylene.

A successful platform launch was again conducted. The flight ascended at approximately 900 fpm to a float altitude of 115,000 feet. Shortly after reaching float altitude the scientific instrumentation stopped functioning. The decision was then made to terminate the flight in view of approaching thunderstorm activity from the West. Termination required valving the balloon down to 44,000 feet to activate the FAA Safety Device. Descent started approximately 15 minutes after valving had commenced. A descent rate of 700 fpm was established with 22 minutes continuous valving. It was anticipated the flight would move in an Easterly direction on descent, corresponding to the trajectory on ascent and stay ahead of the approaching storm front. This anticipated descent trajectory did not develop. The flight not only failed to move in an Easterly direction but the storm front moved in more rapidly than forecast and obscured the flight from visual tracking. As soon as it was evident the Easterly trajectory was not developing, an attempt was made by ballasting to prevent the flight from descending to 44,000 feet and termination occuring. The descent could not be stopped in time, termination occurred and the load descended on the

parachute. The load impacted within the City Limits of Minneapolis. On descent from ceiling altitude the Easterly component of the trajectory was approximately five miles instead of an anticipated fifty. It can only be concluded the approaching storm activity caused a drastic change in upper winds over those encoutered on ascent. The Flight Report for this flight follows.

BALLOON FLIGHT REPORT

Flight No. 911 1050 Z, 22 August 1962

Project No. NA 518 Flight for Dr. Henry J. Mastenbrook
Naval Research Laboratory

Scientific Payload Moisture Measuring Equipment Weight - 109 pounds

Scientific Success Equipment inoperative - None

Balloon Data

Manufacturer Winzen Research Inc.

Size and Serial No. 1-1/4 Million cubic foot No. 39

Type Natural shape - 1 mil polyethylene

Weight 384 pounds

Launching Data

Launch Site Fleming Field, South St. Paul, Minnesota

Launch Method Platform

Wind - Calm Sky - Clear Temperature

Total Payload - 241 pounds Free Lift - 10%, 62 lbs. Gross Inflation - 687 lbs.

Flight Data

Maximum Altitude - 117,000 feet Theoretical Altitude - 115,000 feet

Flight Duration - 6 hours Altitude Maintenance - Good

Ballast - 100 pounds Rate of Ascent - 900 fpm

Landing Site - Minneapolis Recovery Time - 1200 CDT

Balloon Performance - Good Balloon Landing Site - St. Paul Suburb